Dr. Henning Wilts and Andre Bröcker

Implementation of the Circular Economy in Europe

Status Quo and Starting Points

EUROPA

JUST CLIMATE by FES

EUROPA

FES Just Climate

FES Just Climate acts as a think tank about current and coming trends, and a policy advisor in ongoing debates. We support FES offices and their partners in shaping the industrial revolution of our times.

Further information on the project can be found here:
https://justclimate.fes.de/

Friedrich-Ebert-Stiftung

The Friedrich-Ebert-Stiftung (FES) is the oldest political foundation in Germany with a rich tradition dating back to its foundation in 1925. Today, it remains loyal to the legacy of its namesake and campaigns for the core ideas and values of social democracy: freedom, justice and solidarity. It has a close connection to social democracy and free trade unions.

FES promotes the advancement of social democracy, in particular by:

- Political educational work to strengthen civil society
- Think Tanks
- International cooperation with our international network of offices in more than 100 countries
- Support for talented young people
- Maintaining the collective memory of social democracy with archives, libraries and more.

About the authors

Dr. Henning Wilts
Dr. Henning Wilts is the Head of the Circular Economy Department at the Wuppertal Institute for Climate, Environment and Energy. He studied economics at the University of Cologne, and has a doctorate on waste management infrastructure planning at the Technical University of Darmstadt.

Andre Bröcker
Andre Bröcker is working as research assistant at the Wuppertal Institute, Division Circular Economy. He studies Sustainable Development at the Bergische Universität Wuppertal.

Responsible for this publication

Claudia Detsch is the Director of FES Just Climate. Previously, she was editor-in-chief of the IPG Journal in Berlin and editor of the Buenos Aires-based journal Nueva Sociedad. From 2008 to 2012, she headed the FES office in Ecuador and the Foundation's regional energy and climate project in Latin America. She is a sociologist and studied in Hamburg and Barcelona.

Contents

1

INTRODUCTION AND BACKGROUND

1.1 WHAT IS SO NEW ABOUT THINKING IN CIRCLES?

The essential idea of a Circular Economy is not fundamentally new: products and the raw materials they contain should be recovered as far as possible at the end of their use phase and brought back into circulation. This is intended to reduce the amount of waste and extraction, and replace the use of primary raw materials with recycled materials.

However, this requires a fundamental transformation in production and consumption patterns. The following figure illustrates the stronger coordination of different stages of the value chain that lies at the core of the Circular Economy.

- Starting from their conception, products should be designed so that they can be recycled or repaired at the end of their lifecycle. According to many stakeholders, 80 % of how circular product systems turn out in the end is already decided in this early phase.

- Closely connected to this are questions of circular business models as the central adjusting screw of circular value chains: For example, how can incentives be created for durable product design if this initially reduces companies' sales because customers no longer have to replace their products as frequently (planned obsolescence)?

- A central factor here is also the design of logistics or "reverse logistics" structures: For products to truly be recycled in a meaningful way, they must be able to be fed into the right recycling process. At the same time, the recycled secondary raw materials must also return to the companies if they are to use them eventually.

The Circular Economy is often considered to be synonymous with classic waste management, but this does not do justice to its comprehensive, holistic approach. Evidently, closing material cycles requires the optimised collection, dismantling, and recycling of waste streams so that the economy's raw material needs can increasingly be met by recycled materials.

Over the last decades, the amount of waste has persistently risen and will continue to do so if no further action is taken. Today the linear economy is already creating challenges for waste disposal. One must take into consideration that all ecosystems are affected by waste creation and disposal. Plastic waste, for instance, is already a major concern for oceans and maritime life, indicating that today's systems have significant problems of proper disposal and waste management. The future challenge will therefore be to find new approaches to prevent resource use and subsequent waste generation from becoming a problem for different ecosystems, which can only be achieved by implementing Circular Economy systems.

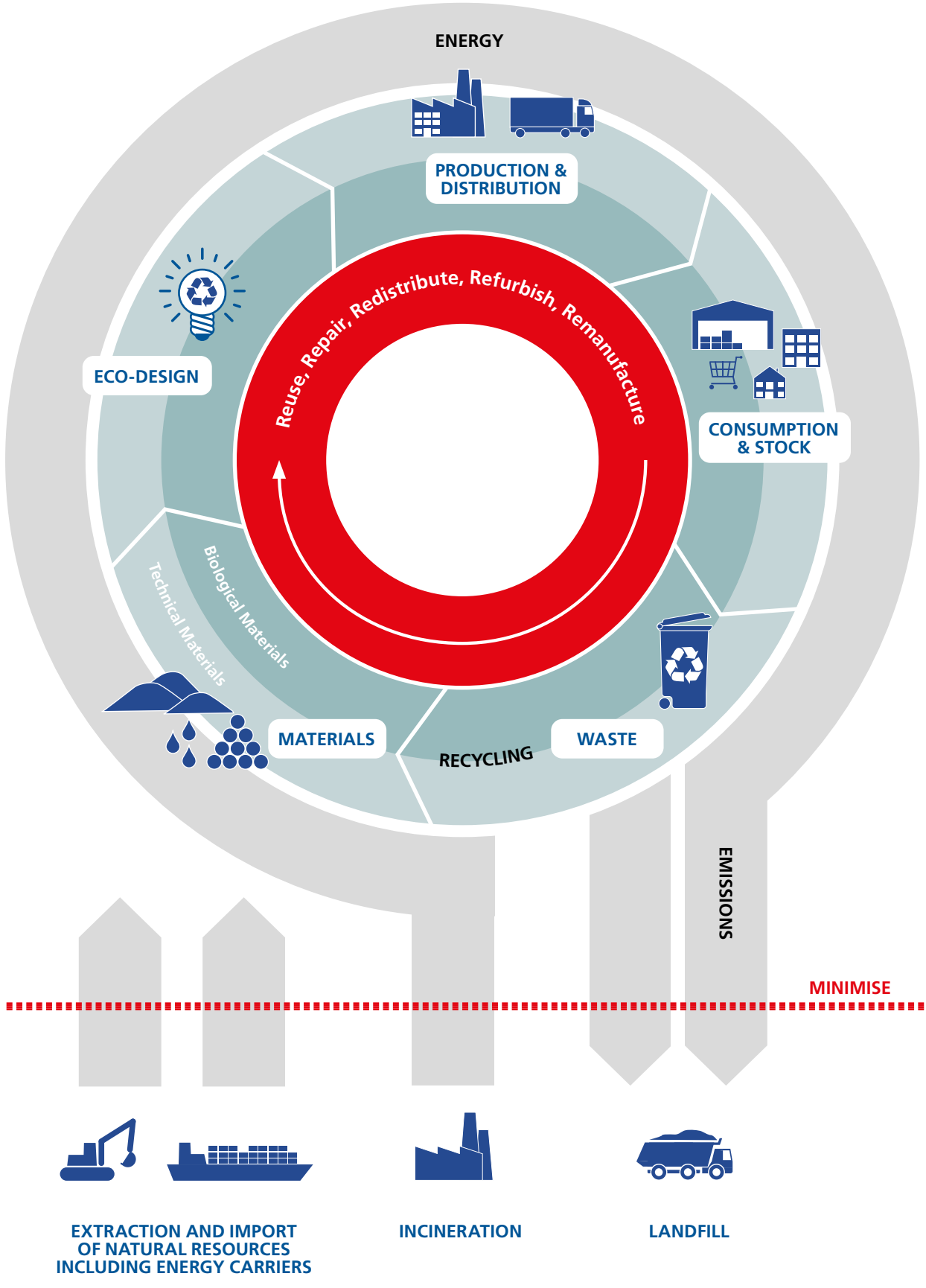
The Circular Economy defines itself fundamentally as a counter-design to the current linear economy, which is characterised by a "take-make-dispose" approach whereby raw materials and other natural resources are taken from ecological systems, often used for a shockingly short time, and end up as waste. In such a linear economy, waste management thereforehas the primary task of reliably disposing of waste so that it no longer threatens human health or the environment. Central approaches with regard to waste disposal are waste incineration or regulated landfilling. These are technological end-of-pipe solutions which enable the continued generation of waste without the prospect of maritime waste, which have shown the limits of the current system and solutions.

The discussion about the Circular Economy is still in an early phase. Furthermore, the term is still often interpreted very inconsistentlyin different contexts. A study by Kirchherr et al. (2017) identified more than 110 different definitions in the scientific literature alone, each of which differ significantly in various aspects:

- There are clear differences with regard to the scope of what is to be understood as Circular Economy. Figure 2 shows the 9R framework according to Potting et al., which represents the range of possible activities from waste incineration to conceptual waste prevention. Many definitions still focus strongly on the material level (R8 + R9).

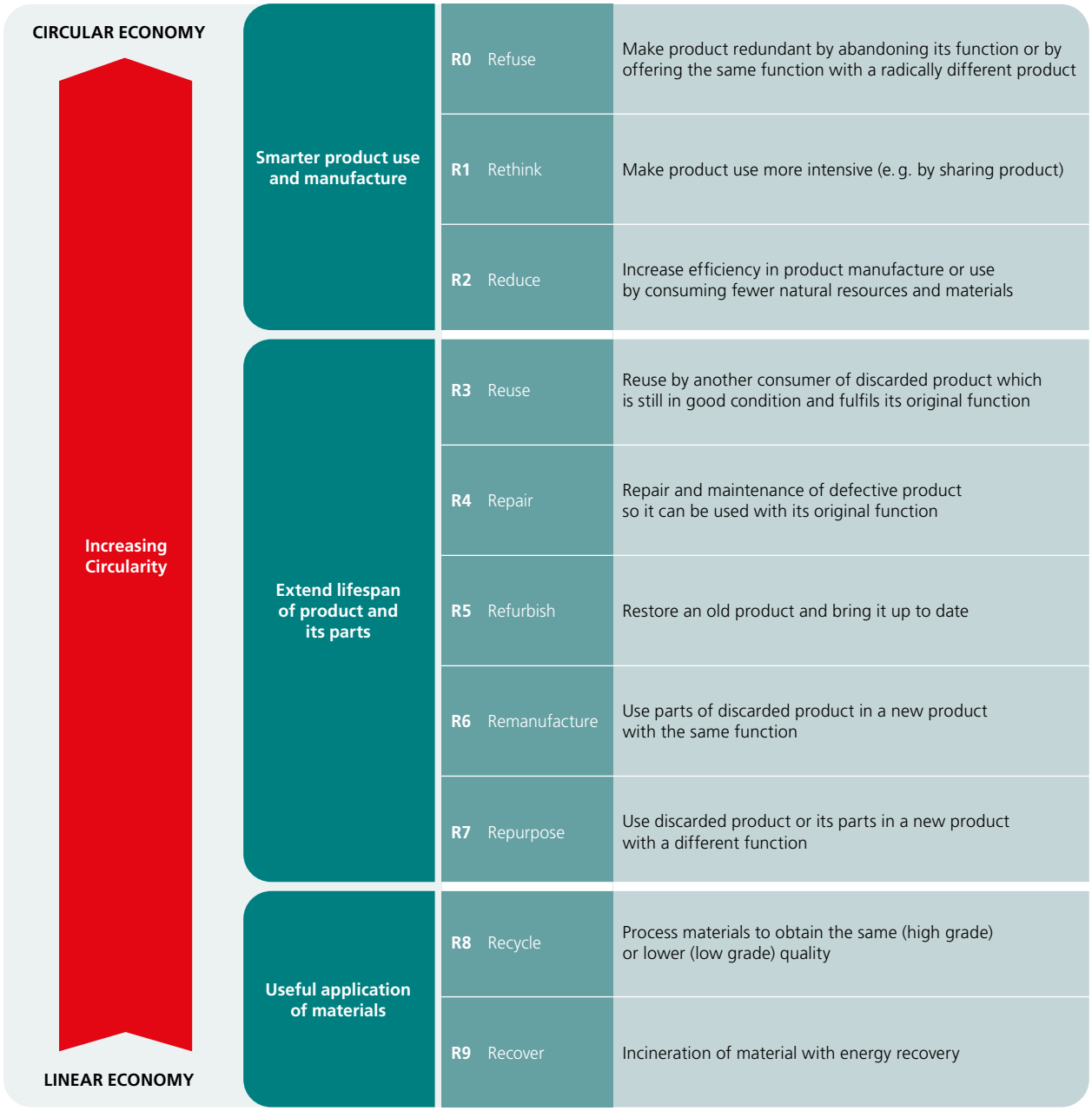
- In addition to Figure 1, there are various representations that differentiate the overall cycle of material flows between a technical and a bio-based cycle (for instance the "butterfly diagram"): The main consideration here is the difference between reducing the consumption of primary non-renewable resources (efficiency) or making the use of bio-based resources sustainable (consistency).

Figure 1
The Concept of Circular Economy



Source: Wilts & Berg (2017)

Figure 2
The 9R Framework



Source: Potting et al. (2017)

– The question regarding the geographic level at which material cycles are to be closed has not yet been clarified: Should the closure of material cycles be achieved on the level of circular cities, circular economies, or circularity on a global level? This has very different implications, for instance for the import/export of waste.

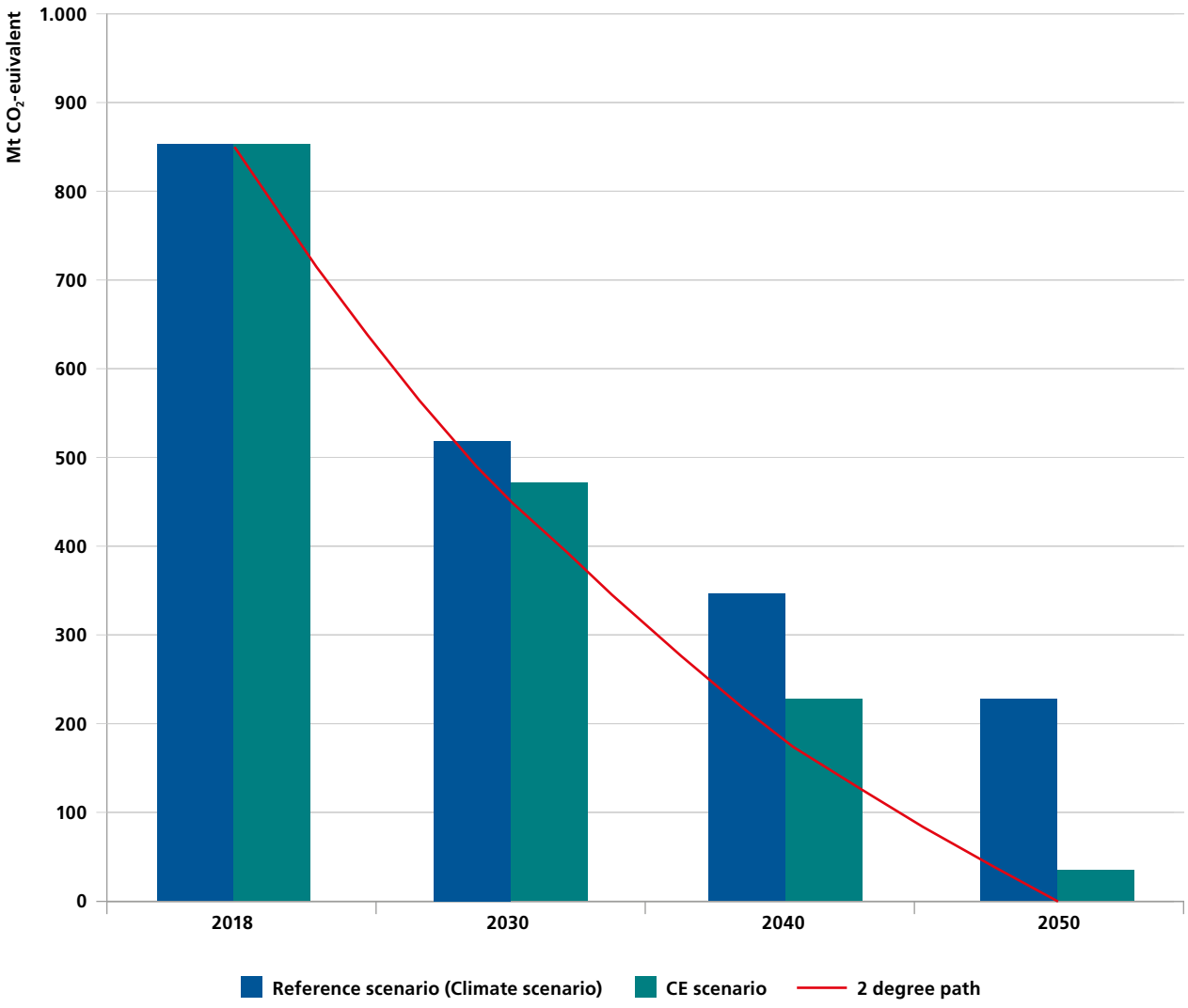
Against the background of such diverging understandings, the International Organization for Standardization started a process to come up with a definition supported by a broad range of stakeholders (ISO/ TC 323). For the purpose of this report, the key aspect of circularity is the contribution to absolute resource conservation by systemic changes: the Circular Economy should not be considered simply as an improvement of the current linear system it aims to replace.

1.2 THE LINEAR ECONOMY AS A DEAD END

The linear economy has accompanied our economic boom and brought us prosperity. However, as its environmental and social effects have now been appraised substantially, CE scholars advocate that it is the only way to move forward, for the following reasons:

– From an environmental perspective, it is clear that the resource consumption associated with this model is far beyond all limits of sustainability. In 2020, for the first time, humanity consumed a total of over 100 billion tonnes of natural resources, and the use of resources such as biomass, ores or minerals has increased fivefold

Figure 3
GHG emissions in the ambitious climate policy reference scenario and a Circular Economy scenario in Germany



Source: CEID (2021)

since the 1950s. According to estimates by the International Resource Panel, resource production and consumption is responsible for 50% of all greenhouse gas (GHG) emissions and over 90% of global species loss (IRP, 2019; Ellen MacArthur Foundation, 2021). This illustrates how the goal of climate neutrality can only be achieved through the framework of a Circular Economy (see Figure 2). Current calculations show that the Circular Economy could enable a third of the necessary emission reductions in the industry by 2050. The energy transition is necessary, but must address and include the equally challenging resource transition.

– There is also an economic necessity for the transformation to a Circular Economy: Europe will only be able to secure its role as an economic and industrial powerhouse if the transition to a Circular Economy is accelerated. Compared to other powers, Europe is dependent on imports of most critical raw materials, which poses increasing risks to the security of supply chains. In addition, many companies are recognising that the comparatively simple linear production patterns can probably be established or copied more cheaply in other parts of the world in the future. The decline of the EU photovoltaic industry due to cheaper imports from Asia is an example of such a development. Against this background, the Circular Economy represents a strategic opportunity to develop global innovation leadership that could secure competitiveness and millions of jobs in Europe.

There is an urgent need to speed up this process – Europe still depends on raw material imports from Russia and China that could have already been replaced by secondary materials from recycling. Materials in this category include palladium, platinum, titanium and vanadium, which are especially important for the automobile and aerospace industry (Gehrke, T. 2022). The following chapter shows that despite the increased awareness of the need to become circular, our patterns of production and consumption are still predominantly linear.

1.3 HOW FAR ALONG ARE THE EU AND ITS MEMBER STATES?

In order to allow consistent monitoring of progress towards a Circular Economy across Europe, the European Commission has developed a framework of 10 indicators, covering different aspects from waste management to innovation. In fact, all indicators show that the Circular Economy is not yet a broadly established concept but is still in its infancy. The worrying figures that follow demonstrate the need to go beyond pilot projects. Figure 4 shows the development of municipal waste per capita in EU-27 countries. It measures the amount of waste collected directly by local authorities and which is disposed of in the waste management system. After a continuous decrease until 2014 the amount began to rise again in 2015.

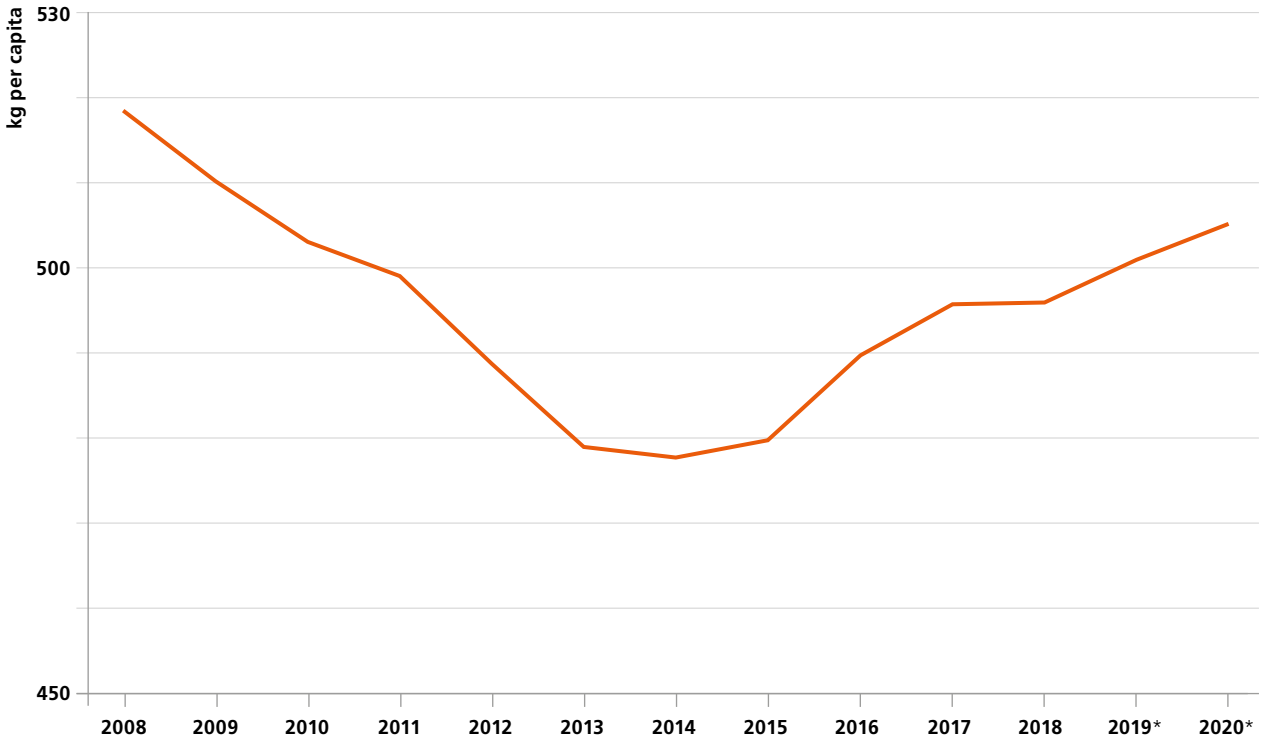
Figure 5 shows the self-sufficiency indicator, which measures how much the EU is independent from the rest of the world for several raw materials. It has been calculated based on domestic production, exports and imports.[1] The detailed indicators for specific raw materials show that the EU is more self-sufficient for certain raw materials (e.g. limestone) than for others (e.g. natural graphite). For most raw materials, the level of self-sufficiency remains relatively constant over time. There are however a few exceptions. Fluorspar and cobalt peaked in 2015/2016, but have decreased since then. The indicator for lithium shows an increasing trend since 2016. However, due to the increasing demand for certain materials, even if the recycling rate were 100 %, the EU would still be dependent on importing different raw materials.

Another interesting indicator to look at is the number of patents related to recycling and secondary raw materials. The indicator is based on the definition of recycling and secondary raw materials in accordance with the relevant codes in the Cooperative Patent Classification (CPC). Multiple counting is prevented by counting the number of patent families, which include all documents relevant to a distinct invention. Between 2008 and 2012 the amount increased steadily, but since then the number decreased almost to the 2008 level.

These indicators for the EU as a whole evidently do not reflect the often very different developments in specific Member States. In order to measure the genuine circularity of different national economies, Eurostat has developed the Circular Material Use Rate (CMUR), which measures the share of material recycled in overall material use. It also considers imports and exports of waste destined for recycling. The overall rate for all EU-27 countries is 12.8 %, with a significant discrepancy among the countries: The Netherlands has the highest rate at 30.9 %, and Romania has the lowest at only 1.3 %. It is interesting to note that usual model pupils such as the Nordics and Austria fare worse than average.

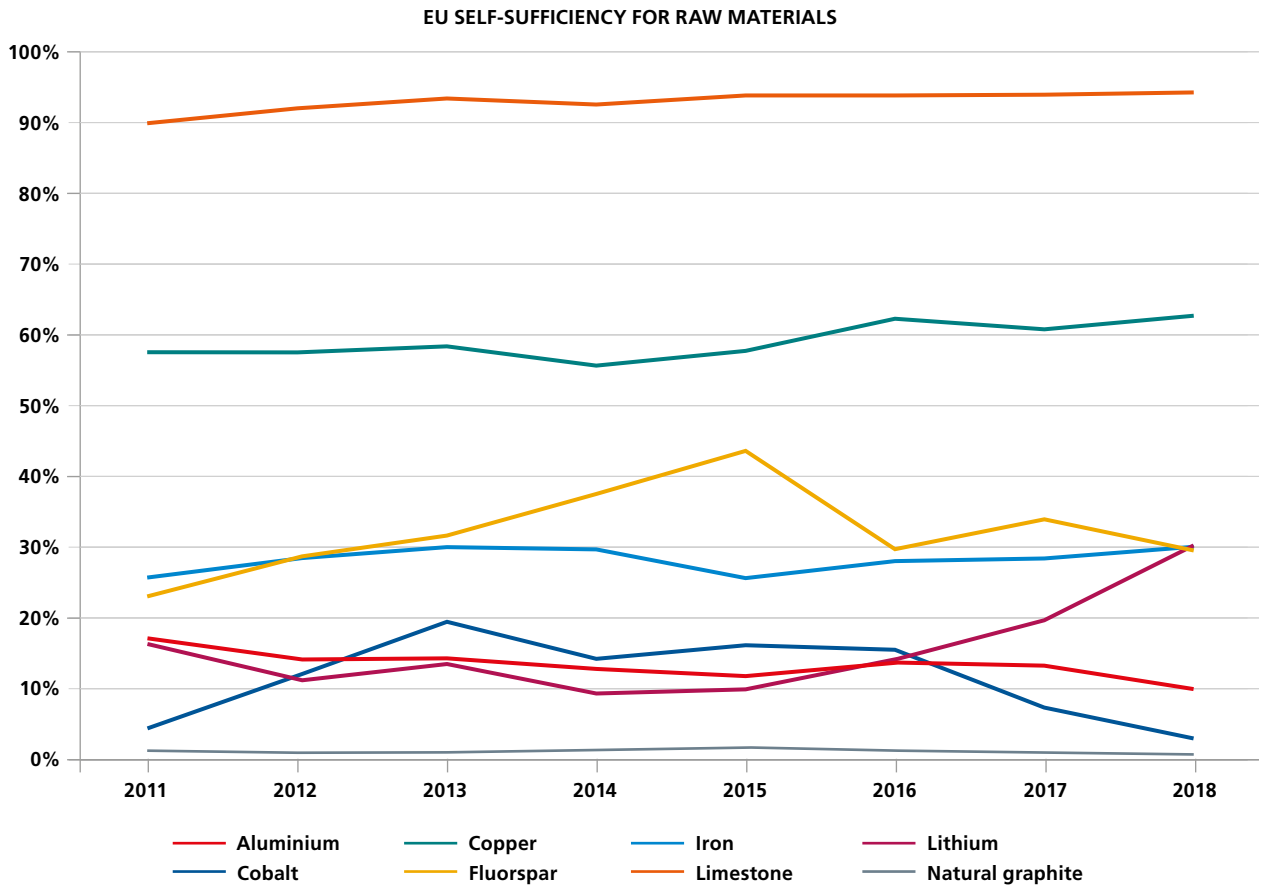
1 The detailed formula can be found at Eurostat (2022b).

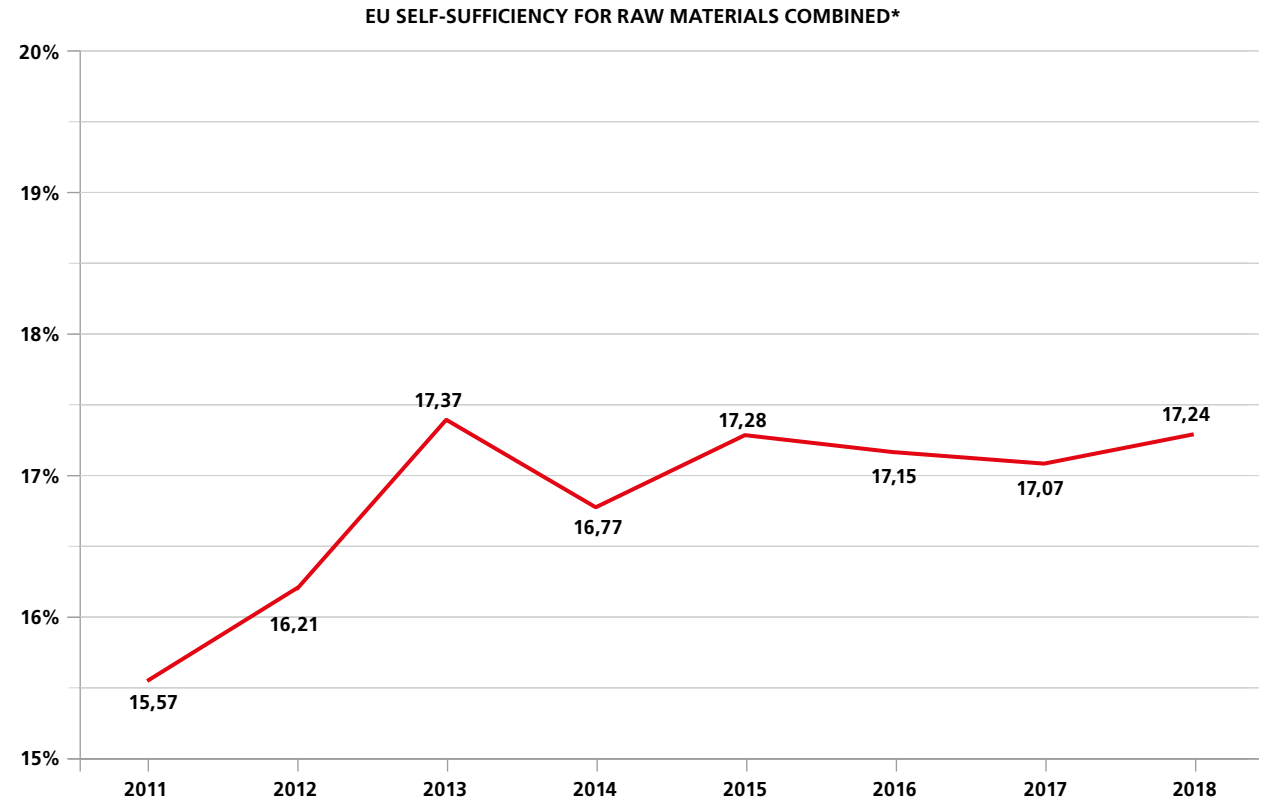
Figure 4
Municipal waste per capita in EU-27 countries



*The amounts for 2019 and 2020 are estimated values.
Source: Eurostat (2022a)

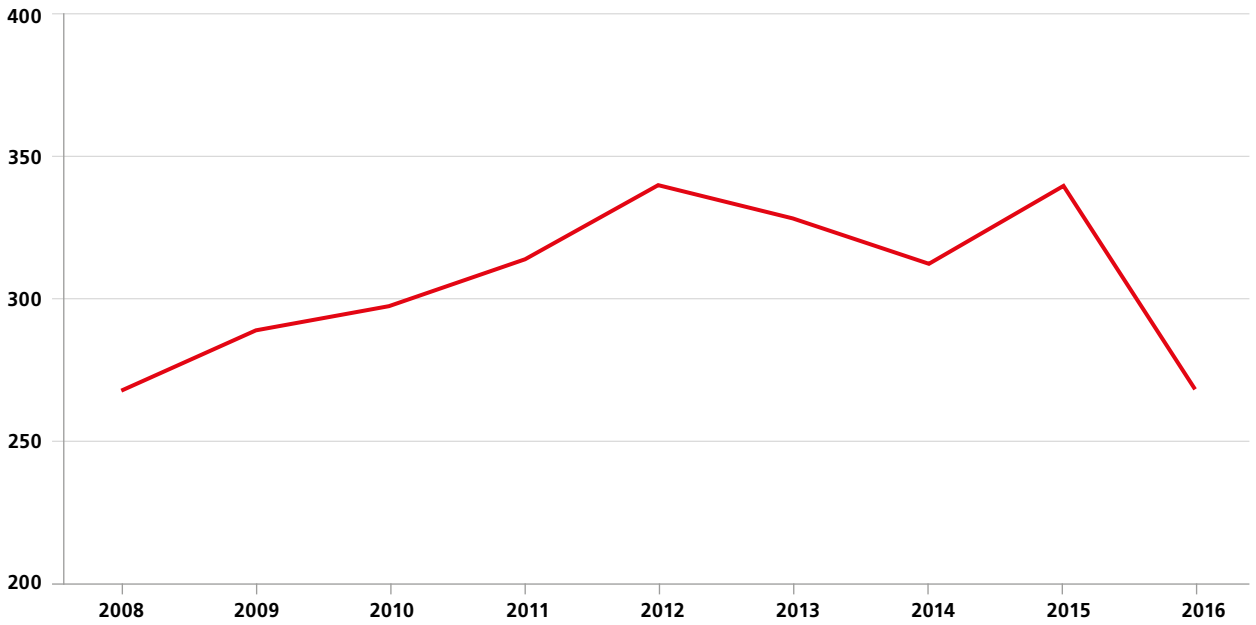
Figure 5
EU self-sufficiency for raw materials





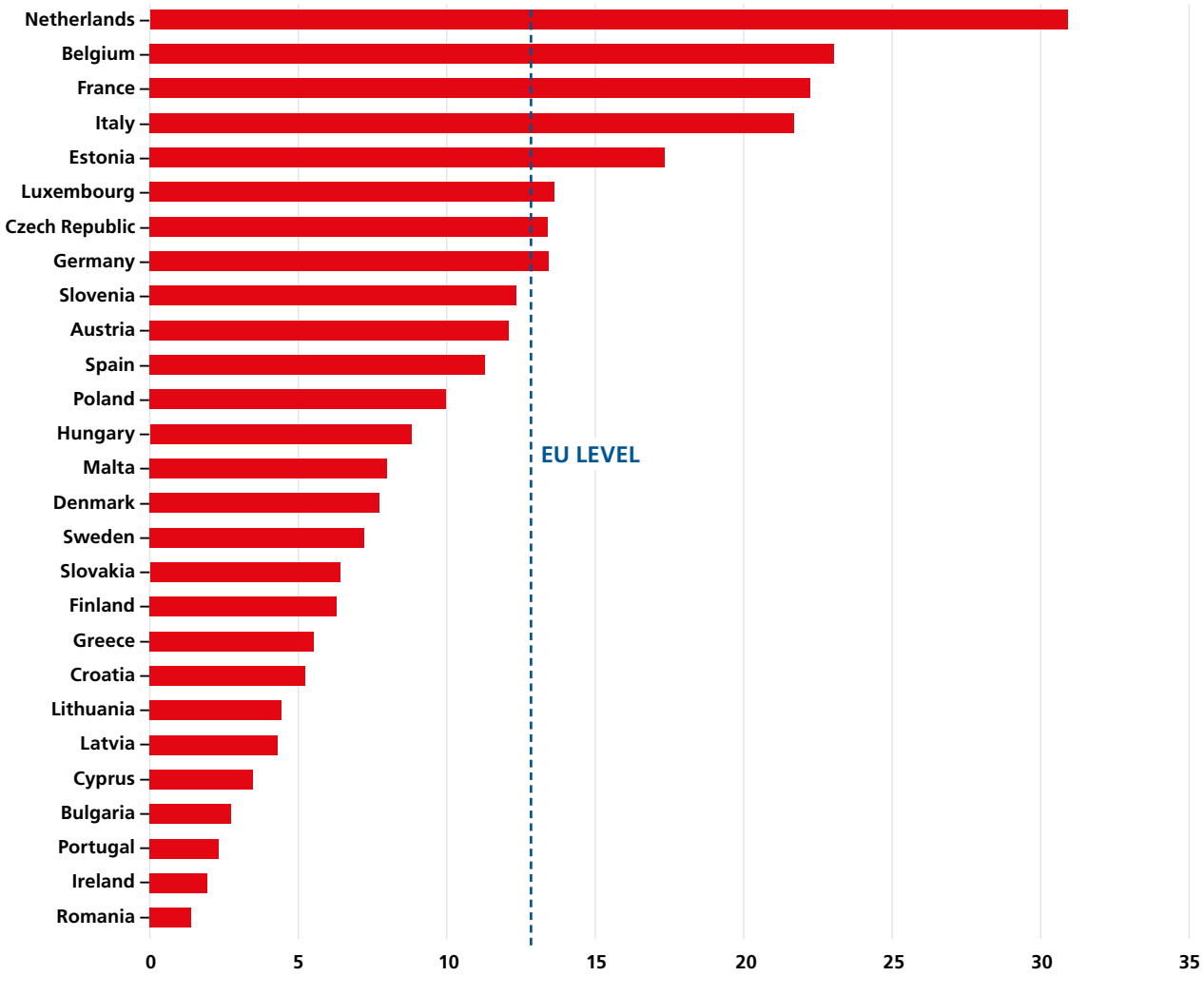
*The combined figure also includes borate, dysprosium, europium, molybdenum, neodymium, tantalum and yttrium, which are all at a constant level of 0 %.
Source: Eurostat (2022b).

Figure 6
Number of patents related to recycling and secondary raw materials, total number in EU-27



Source: Eurostat (2021a)

Figure 7
Circular Material Use Rate (CMUR) for each EU-27 country in 2020 (in %)



Source: Eurostat (2021b)

Overall, it becomes clear that there is still room for and a need for improvement in terms of the reuse of materials in Europe. The rising amount of waste and stagnating self-sufficiency rates underline the urgency to improve respective measures. The sinking number of patents also indicates a need for action.

1.4 THE EUROPEAN COMMISSION'S CIRCULAR ECONOMY ACTION PLAN

Against the background of this massive gap between the environmental and economic potentials of a Circular Economy on the one hand, and the lacking pace of progress towards really exploiting them on the other hand, lies the question of the necessary impulses needed.

The European Commission in particular has become a decisive driving force in recent years and has presented an extremely useful roadmap in the form of Circular Economy Action Plan (European Commission, 2020) which aims at transforming the European Union in the direction of circular value creation. The specifically quantified goals include not only halving the volume of residual waste by 2030 but also doubling the share of recycled materials in the industry, creating 700,000 new jobs and increasing gross value added by 80 billion euros per year. In addition to environmental and climate policy, the Action Plan focuses on the competitiveness and innovative capacity of European industry (European Commission, 2020).

These goals are to be achieved through 35 measures to be implemented by 2023. They include various strategic fields of action along the entire value chain:

- The development of policy frameworks for circular and sustainable products, including a right to repair and the extension of the Ecodesign Directive to include aspects of the circularity of products.

- Specific measures for selected value chains such as packaging, vehicles, or buildings with specific requirements, for instance regarding the proportion of recycled materials.

- The adaptation of classic waste law instruments within the meaning of a Circular Economy – for example, the specification of quantified waste prevention targets in addition to the existing recycling quotas.

- The specific support of cities and regions as key actors in the transformation to the Circular Economy, but also global initiatives such as the support of a worldwide agreement on the topic of plastics.

- Tying the Circular Economy to other goals such as climate neutrality or digitalisation, for example in the development of digital product passports.

2

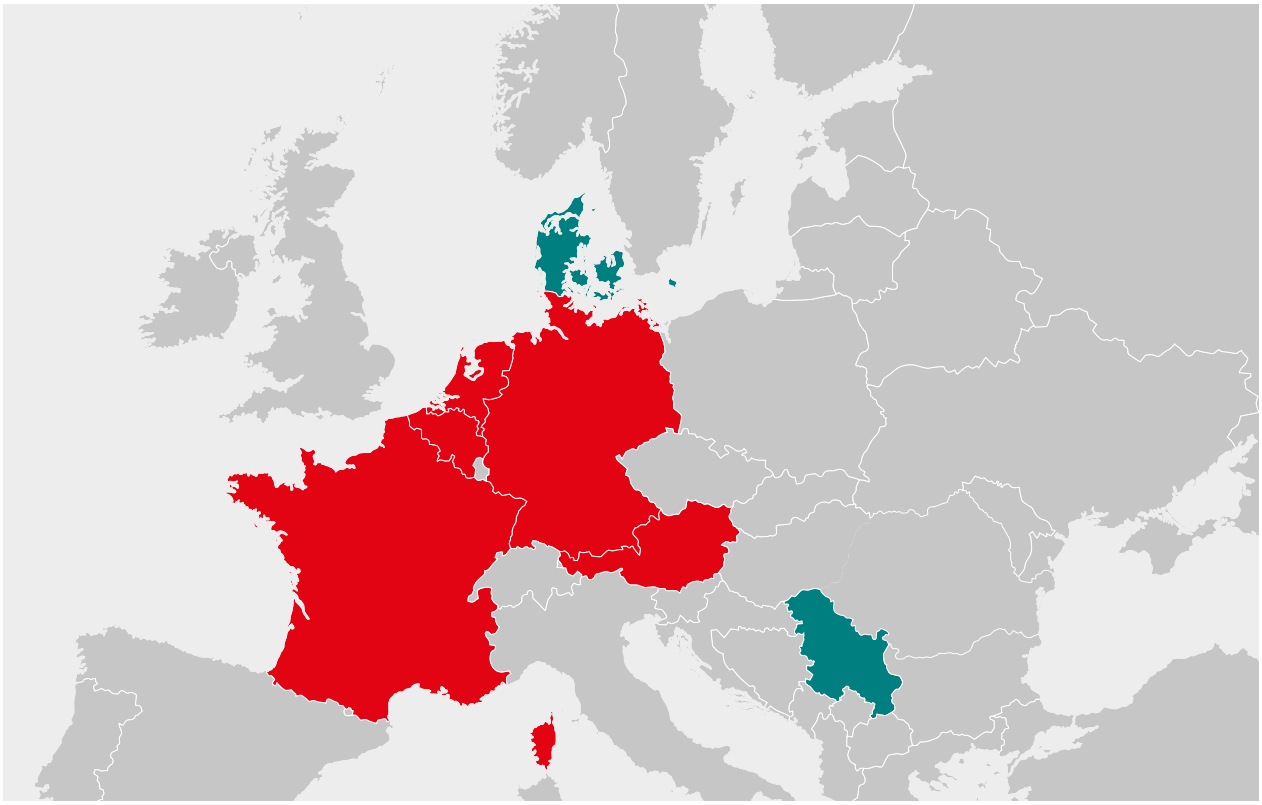
BEST PRACTICES IN TERMS OF IMPLEMENTATION – WHO CAN YOU LEARN FROM?

For the implementation of the ambitious Circular Economy Action Plan, Member States can already build on a large number of good practices in which the public sector has succeeded in increasing circular value creation, avoiding waste and therefore protecting the climate, among other things, through very different policy instruments. In the following, some of these good practice examples will be listed, whereby the presentation does not claim to be exhaustive but rather attempts to emphasise the diversity of possible approaches.

A closer look at the diverse examples underlines the fact that it is not the chosen instrument per se that is suitable or effective for the transformation to the Circular Economy, but rather the concrete design and the adaptation to the respective national or regional context. Therefore, none of the examples presented is suitable for a 1:1 implementation but when adapted to the respective circumstances, all of them could in principle also be implemented in other countries. Eastern European countries began to adopt existing good practice examples according to their specific requirements, governance, as well as industrial structures, for example as part of the MOVECO project that developed transnational strategies for a Circular Economy in the Danube region.[2]

2 https://www.interreg-danube.eu/uploads/media/approved_project_output/0001/32/7ea67d79539dbcd43e712485d-4a37b41d81219eb.pdf

Figure 8
Best and Good Practice in European Countries presented in this report



2.1 GREEN DEALS FOR CIRCULAR TRANSITIONS (NETHERLANDS)

The Netherlands is regarded worldwide as a pioneer of the Circular Economy and has already achieved impressive successes in this area in recent years. In 2012, the government made the Circular Economy a central policy area. In 2016 a target of reducing primary energy consumption by up to 50 % by 2030 was set. A key element in achieving the targets is the creation of a new governance approach called "The Green Deals". The key element is to allow stakeholders to suspend administrative regulations that hinder more circular solutions, for instance in the field of waste shipment regulations, if they make it unattractive to use waste materials in other companies close by. They establish an information channel between companies and stakeholders that serves as a driver for greater sustainability and joint projects in the field (van Langen & Passaro, 2021; Green Deals, n.d.).

The Green Deals are implemented by the government primarily in GHG-heavy sectors in order to be able to significantly reduce emissions in these sectors. These are mainly sectors whose GHG emissions account for up to 75 % of total emissions in the Netherlands and are classified as priority. The Green Deals are complemented by new legislation at the regional or national level. This is intended to create a signalling effect for companies. In this way, companies will be modernised and made more efficient through new technologies and machines, while at the same time significantly reducing emissions. This makes the whole economy more efficient and can consequently give the Dutch economy a competitive advantage. In total, there have been 232 Green Deals up to 2020, 53 of which are still in the implementation phase while the rest have been successfully completed. An analysis by Van Langen & Passaro (2021) shows that most green deal agreements related to the Circular Economy fall under the resources theme, with a total of 35 out of 50 agreements falling under the CE theme. The bio-based economy, construction and energy themes are also represented by a large number of projects related to the Circular Economy (see Table 1).

All measures must be supported by the government, with a contact person from a ministry or a government organisation signing off on the Green Deals. This creates a close network of signatories and supporters, which emphasises the

Table 1
Number of Circular Economy-related Green Deal Agreements per industry

Industry/Field	Total CE-related Agreements	% of Total CE Agreements
Agriculture	3	6
Chemicals	2	4
Construction	9	18
Electronics	2	4
Entertainment	2	4
Food	1	2
Fishing	1	2
Forestry	1	2
Health Care	1	2
Metallurgy	1	2
Vehicles	1	2
Plastics	2	4
Railways/Trains	2	4
Shipping	1	2
Textile	2	4
Waste	2	4
Water	4	8
Multi/Labelling	5	10
Multi/Procurement	2	4
Multi/Other	4	8
Total	**50**	**100**

Source: Van Langen & Passaro (2021)

increasing importance of networks (Lundvall et al., 2002; Lundvall, 2007). The network aims to facilitate the exchange of expertise and ensure a steady flow of information. The measures aim to change laws and regulations in such a way that the Circular Economy can be implemented more effectively. In this way, obstacles to implementation are directly circumvented, which the Netherlands, as well as every other country, is confronted with. This builds up a national innovative strength that can serve as a model for other countries.

2.2 MANDATORY MARKING OF REPARABILITY (FRANCE)

As highlighted by the CE Action Plan, the design of electronic products is of crucial importance for circular business models as well as circular consumer choices. Unfortunately, it is often extremely difficult for consumers to understand which product could easily be repaired and which not. Without this information consumers often tend to choose the cheapest product – even if total lifecycle costs are significantly higher. Some pilot projects have been offering more resource- and energy-efficient appliances to low-income households (see The Blue Project and The Papillon Movement).

Against this background, France came up with a repairability index for 5 categories of electronic devices on 1 January 2021 (see Spareka, n.d.). This was based on a law adopted by the French government regulating the mandatory display of clear information for consumers on the repairability of electrical and electronic equipment. The aim of the index is, on the one hand, to encourage consumers to choose more repair-friendly products more often and, on the other hand, to encourage manufacturers to advance the reparability of their products. It applies to 5 categories of products sold in France, namely:

1) Smartphones
2) Laptops
3) Televisions
4) Washing machines
5) Lawnmowers

The index assesses 5 criteria: i) documentation, ii) disassembly, iii) availability of spare parts, iv) price of spare parts, and v) product-specific aspects. The evaluation categories 1 to 4 are the same for all of the above-mentioned product groups. The fifth evaluation criterion assesses product-dependent features in each case, for instance, the software package for smartphones, laptops and televisions. Each criterion can be rated with up to 20 points, which are then added together based on the 5 criteria to give a possible final score of 100 points. The manufacturer calculates the index by using information provided by the Ministry of Environment. This rating index must be made available to customers for the product in question.

The repairability index will be replaced by a durability index from 1 January 2024, which will include both aspects of repairability and reliability of the products, as well as better feedback forms. For this purpose, manufacturers are obliged to submit a report sheet in a standardised format, which lists the assessment of their product in the different sub-criteria. The following table shows the report sheet of the Fairphone 3+ (see Table 2).

2.3 REPAIR CENTRES TO COMBINE ENVIRONMENTAL BENEFITS WITH SOCIAL-ECONOMIC OPPORTUNITIES (BELGIUM)

The prolongation of product life spans is one of the core strategies of so-called "inner circles'', aiming to preserve the reuse potential of products at the end of their use phase as optimal as possible by setting up infrastructures for the preparation for reuse and repairing products that are no longer functional. The De Kringwinkel (circle of life) network in Flanders brings together environmental benefits with socio-economic opportunities (Komatsu, 2016). The 24 centres from the network collect and repair donated goods and resell them at low prices. By employing long-term unemployed, the Kringwinkel centres are considered WISE, i.e. work-integrated social enterprises.

The Kringwinkel model combines three essential community needs: (1) stable employment within a genuine labour market integration with a supportive work environment; (2) high-quality goods at an affordable price; and (3) the need for a more environmentally sustainable consumption pattern in society.

After a minimum employment of at least 1 year, the worker is again entitled to receive unemployment benefits. The local welfare centres (OCMW) being their employers, the period worked is counted as training time. This training period is intended to help the long-term unemployed gain skills and experience to meet the challenges of longer, stable employment.

Building on the developments of labour market integration policies, the gap between service and goods providers was reworked from the perspective of subsidiarity and intermediary employment. In the 1990s, such legal forms were created as the "social workplace" and "social purpose enterprises" to encourage social entrepreneurship. The legal forms created enabled the state to build a direct employment strategy in enterprises with a social or environmental mission.

One of the largest Kringwinkel centres, De Kringwinkel Antwerpen employs over 270 people. The employees are employed in various activities and are placed in suitable areas according to their personal strengths. Examples include the activities of collecting furniture, sorting clothes, repairing household and consumer electronics, and setting up shops. The repaired goods are sold under the brand name "De Kringwinkel" to customers who want to buy below market price, are looking for something old or want to protect the environment by reusing it. DKA has delivery vans that can both pick up and deliver.

Figure 9
Components of the Repairability Index

Source: Spareka (n.d.)

Table 2
Repairability Index for the Fairphone 3+

Criteria	Sub-Criteria	Score of subcriterion	Weighting factor subcriterion	Score subcriterion	Total criteria score
Documentation	1.1 Availability of the technical documentation and other documentation related to user and maintenance instructions	8.5	2.0	16.9	**87.3**
Disassembly, Accessibility, Tools, Fasteners	2.1 Ease of disassembly parts from List 2*	10.0	1.0	20.0	
	2.2 Necessary tools List 2	10.0	0.5		
	2.3 Fasteners characteristics from list 1** and List 2	10.0	0.5		
Availability of spare parts	3.1 Availability over time for parts from List 2	7.9	1.0	14.4	
	3.2 Availability over time for parts from List 1	6.4	0.5		
	3.3 Delivery time for parts from List 2	6.7	0.5		
	3.4 Delivery time for parts from List 1	6.7	0.5		
Price of spare parts	4.1 Ratio between price of parts from List 2 to the price of the product	8.0	2.0	16.0	
Specific criterion	5.1 Information about type of updates	10.0	1.0	20.0	
	5.2 Free remote assistance	10.0	0.5		
	5.3 Possibility to reset software	10.0	0.5		
Reparability index on 10					**8.7**

* List 2: List of a maximum of 3 to 5 spare parts (depending on the category of equipment concerned) whose broken or malfunctioning parts are the most frequent.
**List 1: List of a maximum of 10 other parts (depending on the category of equipment concerned) whose good condition is necessary for the equipment.
Source: Spareka (2021)

Thanks in part to the 24 De Kringwinkel stores, Flanders has been following the Netherlands' lead in terms of reuse. Circular Flanders conducted a study revealing that in 2019, the Flemish network of reuse centres accounted for 11 % to 19 % (depending on the category of goods) of total reuse (Circular Flanders, 2022). Based on the share percentage of the reuse network, they calculated the amount of reuse for the four main product streams per capita in Flanders:

1) Furniture: 14.9 kg reuse/capita
2) Household goods, leisure, books, music and multimedia: 11.6 kg reuse/capita
3) Textile: 7 kg reuse/capita
4) Electric appliances: 3.2 kg reuse/capita
   Total: 33.3 kg reuse/capita

2.4 REUSE OF BUILDING COMPONENTS (AUSTRIA)

Another key value chain highlighted by the European Commission's CE Action Plan is construction and housing, which is responsible for around 60 % of the total waste generated in Europe. Reuse of building components could be an opportunity to save enormous amounts of embedded "grey" energy that has been used for the production of windows, doors, and stairs for instance. Against this background the Austrian "BauKarussell" has developed a unique approach:

BauKarussell is one of the first providers of social urban mining, the recycling-oriented dismantling and reuse of building components (RepaNet, 2018). The enterprise assists companies in the construction industry with the planning and implementation of the deconstruction of large-volume objects and increases the added value prior to mechanical demolition through so-called social urban mining. By separating recyclable building materials, those which are still usable can be reused in the construction industry. Through reclamation, re-use products such as doors, tiles, attic windows, parquet flooring, and façade elements can be integrated into the new construction planning in order to fully integrate the deconstruction phase into the overall planning. Components that can be reused are to be prepared immediately for reinstallation elsewhere. To this end, assembly techniques are being developed to significantly facilitate the removal and installation of parts.

Similar to the Kringwinkel centres, BauKarussell places a special emphasis on social aspects. For example, those over age 50, long-term unemployed people, and those with mental or physical disabilities can be employed and receive qualifications, job training and hence better chances in the labour market as transit workers. The BauKarussell concept of social urban mining has been implemented since 2017 in projects such as the Glaspalast (former computer centre of the City of Vienna; client: BUWOG) and the MedUni Campus Mariannengasse (client: Bundesimmobiliengesellschaft in Vienna) and was supported by the Federal Ministry for Digitalisation and Economic Location and by the Waste Avoidance Promotion of the Austrian Collection & Recycling Systems for Packaging.

2.5 OBHUTSPFLICHT (DUTY OF CARE) TO MAINTAIN THE USABILITY OF PRODUCTS (GERMANY)

One major challenge in several industries is the number of products that are destroyed without having ever been used. Within the textile industry, the reasons for this are the trend towards "fast fashion": inexpensive clothing that keeps up with the latest trends. On top of this, there is a record volume of returns, due in particular to the surge of online retailing. In Germany, online fashion retailers stated that an average of 50% of their products are returned (Statista, 2020). The retailers try of course to re-sell these products but this is not always possible, due to damages to the products or consumers preferences that might have changed in the meantime. These trends thus lead to significant quantities of goods that are eventually destroyed and therefore to a waste of natural resources. There is little to no data on returns and no studies or data on the destruction of overhangs. To address this problem, the German Circular Economy law offers the option to obligate companies to provide a transparency report in order to gain knowledge about the true extent of destruction. In order to develop an effective reporting mechanism, the German ministry has been seeking dialogue with trade associations, online retailers, third-party recyclers and other relevant stakeholders. The aim of the dialogue is to examine how transparency can be created about the extent of and reasons for the destruction of goods. This also includes the provision of necessary data, concepts for dealing with overstocks and returns, and legal requirements due to which goods must be destroyed.

Against this background, the federal government in Germany has included the concept of a so-called "duty of care" in the German Circular Economy regulation (BMUV, 2020). This duty of care is essentially a new form of product responsibility and states that if products are distributed, it must be ensured that they remain fit for use and do not end up in landfill. The generic regulation covers all products and their distribution, transport, and storage. It is therefore an upstream basic obligation of waste avoidance. In order to become really effective, this duty of care will require specific legal regulations that are currently under development. The main obligation – maintaining the fitness for use of the product – also includes operational and organisational precautions (e. g. careful handling, sale before the expiry of shelf life or reduced sale through other distribution channels). Only if this is no longer technically or legally possible (e. g. due to health hazard) or economically reasonable, can the disposal as waste be considered.

2.6 ROLLING OUT THE CIRCULAR ECONOMY ACROSS EUROPE

On behalf of the European Environment Agency, the European Topic Centre has compiled an overview based on 280 examples of good practices and innovative approaches.[3]

3 Full details are available in the individual country profiles in: EEA (2019).

In total, Circular Economy topics have been increasingly in the focus of public as well as private decision makers over recent years. It became obvious that countries and regions also use several economic instruments to stimulate material resource efficiency and the Circular Economy. These instruments include forms of taxation or financial support for investments, innovation, and research. With the support of this funding, research projects are aimed at developing knowledge; innovation projects are aimed at converting knowledge into solutions, products or services with high technology- or market-readiness levels and the support of investment projects aims to promote the implementation of existing solutions.

With regard to good practices in innovation, it was shown that many examples include an incentive for collaborations between companies (especially small and medium-sized enterprises (SMEs)) and knowledge institutions (EEA, 2019). Box 1 shows two specifically innovative good practices in this area.

Another important action field is green and circular public procurement. In the past, various countries have already included social aspects in public procurement. Furthermore, the analysis by EEA highlighted that an increasing number of EU Member States included environmental, resource efficiency, and circular aspects into the criteria of public tenders. Responses from the Netherlands, the Belgian region of Flanders, and Denmark explicitly mentioned circular public procurement as an example of good practice in their region. Croatia also adopted green, circular procurement initiatives in 2015. Moreover, the region of Wallonia in Belgium plans to launch an action plan on circular public procurement (EEA, 2019).

Taxation is used both as an incentive (e.g. tax discounts for preferred behaviour) and as a deterrent (e. g. raising costs of unwanted effects). It was mentioned that economic instruments supported the implementation of new economic activities that were beyond R&D and that were favouring resource efficiency and Circular Economy (EEA, 2019). Box 3 describes the approach pursued in Serbia. Table 3 gives an overview of countries that use taxes or fees to support resource efficiency and the Circular Economy.

Another crucial approach for resource efficiency and the Circular Economy is the reduction, prevention, and management of waste. The respective initiatives that were mentioned mainly focus on the prevention for entire product

Box 1
Examples of good practice in addressing innovation

Denmark: Eco-innovation programme

The Danish eco-innovation programme MUDP aims to support the development and application of new environmental and resource-efficient solutions that address prioritised environmental challenges. It aims at strengthening the cooperation between companies, knowledge-based organisations, and partners in the EU within the field of environmental technology. The MUDP is a public subsidy scheme with a budget of 12 million EUR. The focus is on Circular Economy, recycling waste, and ecological and sustainable construction (Miljøstyrelsen, n.d.).

Serbia: Green innovation vouchers

The European Bank for Reconstruction and Development, with the support of the Central European Initiative and the Austrian government, has launched a programme to foster synergies between science and research organisations and the economy. The programme includes the introduction of green innovation vouchers, designed to support innovation in green technology and resource efficiency, covering up to 90 % of service costs for SMEs for defined projects. In comparison to normal grants, these innovation vouchers are smaller in funding volume and are planned to be implemented in a few weeks rather than months or years. With this programme, the long-term competitiveness of the Serbian economy is supported and its impact on climate change is reduced by focusing on building up a green economy with a focus on green technologies and resource efficiency.

Box 2
Example of good practice in public procurement

Wallonia (Belgium): Action plan on responsible public procurement

The commitment to the new action plan on responsible public procurement for 2017–2019 was renewed by the government in 2017. Responsible public procurements are procurements that contribute to the fight against climate change, avoid social dumping, and contribute to efficient resource management. SMEs are also encouraged in these procurements. The strategy is to use public procurements as leverage to foster the efficient use of resources generally. Complementary tools such as specific information sessions on circular public procurement or an online platform will help to achieve this goal (Public service of Wallonia, 2017).

groups (e.g. food, textiles). With regard to plastics, some countries and regions have already agreed on several policy plans. For instance, the Netherlands launched the Plastics Pact in 2019 and Flanders has an integrated policy plan for plastics. These two initiatives cover the entire lifecycle of plastics and are high on the EU policy agenda (EEA, 2019). The recycling rate of plastic in Belgium is still significantly lower (47 %) than that of cardboard and metals (over 90 %). Yet plastic is the third most widely used packaging material in the country.

Several countries reported that they have implemented programmes to enhance investments in technology, equipment, or infrastructure that aim to foster resource efficiency and the Circular Economy (see table 4).

Some respondents such as Sweden and Estonia provided good practice examples related to enhancing repair and reuse measures. For examples, Croatia, Ireland, and Italy focused on product groups under extended producer responsibility schemes. Scotland developed a national reuse stand-

Box 3
Examples of good practice regarding taxation

Serbia: Report on economic instruments for environmental protection
In Serbia, the national Environmental Protection Agency publishes an annual report on economic instruments for environmental protection. This report illustrates the goals achieved and measures of the environmental policy defined in strategic and planning documents. The report includes revenues from fees and charges, funds for subsidies and other incentives (Environmental Protection Agency Serbia, 2017).

Table 3
Reported examples of using taxes or fees to support resource efficiency and the Circular Economy

Country	Tax or levy measure
Finland	Tax credit for small renovation works
Hungary	Environmental product fee, landfill tax (revision ongoing)
Ireland	Polluter pays principle in extended producer responsibility schemes
Italy	Environmental contribution by plastic producer
Latvia	Natural resource tax
Lithuania	Environmental pollution tax
North Macedonia	Tax on imported used goods
Norway	Tax on packaging
	Tax exemptions for charitable food donations
Portugal	Tax deduction for R&B costs
Serbia	Tax benefits for reuse and use of waste as a secondary material
	Landfill fee
	Natural resource fees
Sweden	Reduce value-added tax (VAT) for repairs
Switzerland	Landfill tax
United Kingdom (England)	Landfill tax
	Aggregates levy
	Plastic bag charge
United Kingdom (Scotland)	Carrier bag charge

Source: EEA (2019)

Table 4
Reported examples supporting investments in resource efficiency and the Circular Economy

Country	Fund
Denmark	Green Investment Fund for Sustainable Development, green development, and demonstration programme (GUDP)
Estonia	Investment support for resource efficiency in enterprises
Finland	Impact investment to promote well-being in a resource-wise way
Latvia	Investment in waste management infrastructure
Netherlands	Investment support for buying environmentally friendly products or company resources
	Flexible depreciation of investments
Portugal	Environmental financial fund
Sweden	Grants for leading-edge technologies and new system solutions
Turkey	Solid waste investment programme
	SME loan fund for waste reduction
United Kingdom (Scotland)	Circular Economy Investment Fund
United Kingdom (Wales)	Infrastructure development in relation to recycling
	Circular Economy Investment Funds

Source: EEA (2019)

ard for shops that sell second-hand goods and Flanders established a voluntary online tool (TOTEM) for assessing the environmental impacts of new or refurbished buildings (EEA, 2019).

Furthermore, the EU action plan for the Circular Economy emphasised the need for innovative business models to create systemic changes towards a more Circular Economy. In order to support the research and development of these new business models, the EU announced funding for this purpose. One example of such new business models is the Product-as-a-Service Concept. The idea of this model is to shift from ownership of products to leasing/renting products. A similar concept is the "sharing economy", which refers to the joint use of goods through sharing, swapping, lending, renting, or giving. Further examples that were mentioned included online tools (e.g. the Circulator Tool for business models in Flanders), studies or research projects (in England, Switzerland, and Slovenia), support mechanisms for entrepreneurs (in Norway, Scotland, and Serbia), the competitiveness of industrial zones (in Turkey), networks of non-profit organisations for the lifetime extension of products (in Austria), and chemical leasing (in Serbia) (EEA, 2019).

3

IMPULSES FOR THE CIRCULAR ECONOMY – PREREQUISITES FOR A COMPREHENSIVE TRANSFORMATION

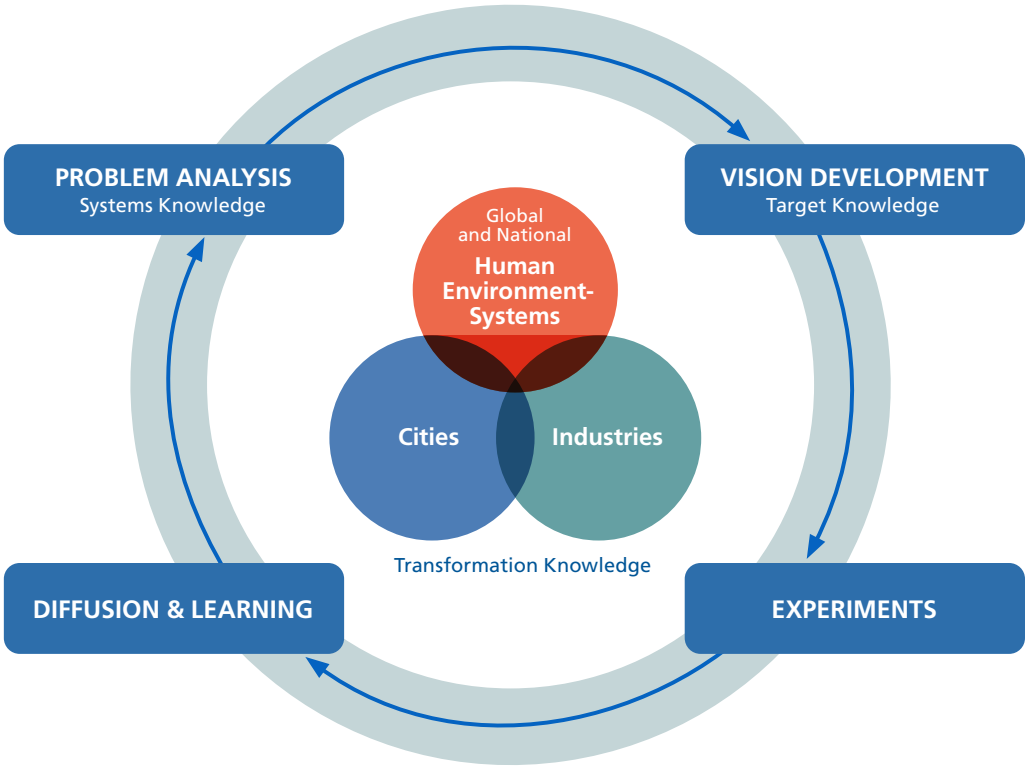
The good practice examples presented in this report demonstrate that the transformation to the Circular Economy is not only convincing and necessary in theory (cf. Chapter 1), but is already possible today with the available state of the art and under the existing regulatory framework. The number of lighthouse projects in the various value chains continues to increase; here, the contributions to job creation, the reduction of material costs and, of course, climate and resource protection become quite tangible in practical terms.

At the same time, conclusions can be drawn for the necessary framework conditions and impulses on how such a transformation process can be supported and accelerated. For all progress achieved already, it is clear that the current rate of the change process is not sufficient in view of the described ecological and economic challenges.

Yet the fact is that we are not leading this race. China is ahead in the number of patents filed as an indicator of the innovative capacity of economies. This is the result of massive and very strategically oriented Chinese investments in research and development for the Circular Economy.

The transformation of such a complex and at the same time heterogeneous economic structure as the European Union towards a Circular Economy therefore requires a clear analytical concept of how such a change process can take place. The following figure illustrates the concept of the "Transition Cycle", which differentiates the knowledge and process steps required for this. Technical challenges, regulatory barriers, and resulting path dependencies in the context of the Circular Economy have been analysed intensively in various studies, as have the potential benefits: in

Figure 10
The Transition Cycle as a Framework Concept for the Transformation of the Circular Economy



Source: Wuppertal Institute

fact, the challenge is rather to move from problem analysis now to a phase of implementation.

The following steps of the transition cycle will be addressed: the development of a consistent vision of a circular Europe, the facilitation of experimental spaces for circular value creation, and finally the central question of the rollout. How does the Circular Economy come out of the niche and how can it replace the existing linear system as comprehensively as possible?

3.1 VISION DEVELOPMENT AND TARGET KNOWLEDGE

Transformation processes in the dimension and complexity of a change from a linear to a Circular Economy can neither be prescribed top-down nor prescribed in detail. In addition, thousands of research and development projects have been initiated, the results of which are not yet foreseeable in detail. There are changes in the behaviour of households, which can react very differently to new circular products and services.

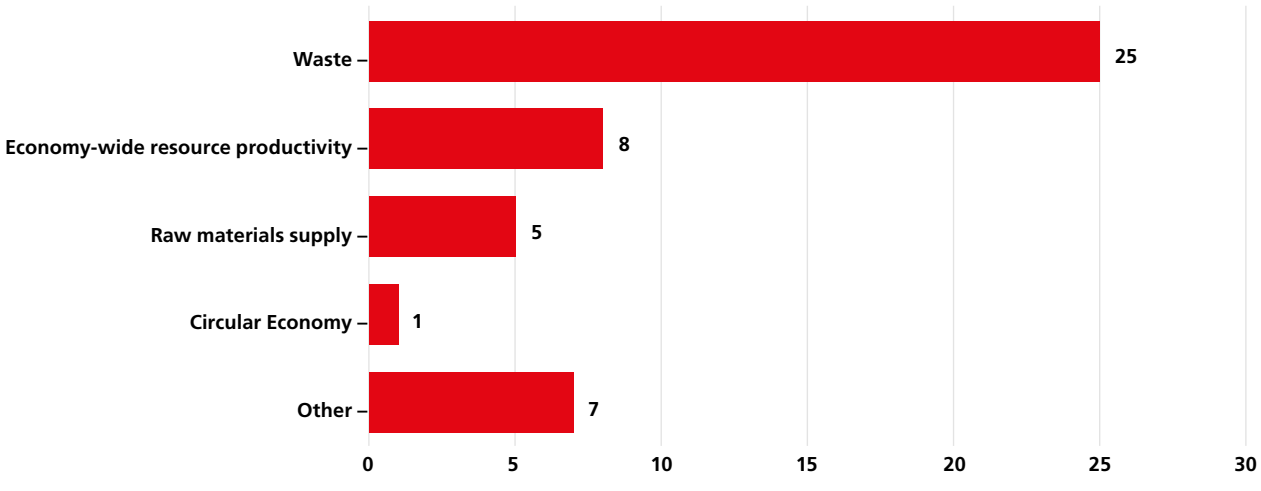
Therefore, it is certainly not possible to prescribe in detail what a circular Europe should look like in 2050 or even in 2030. Nevertheless, such a vision is needed if actors are to be sensitised and motivated to change their behaviour. Planning security for investments plays a central role: The transformation of entire value chains will require investments in the trillions in the upcoming decade, which should be integrated as precisely as possible into the modernisation and renewal plans of companies, which are due at regular intervals anyway. Unsurprisingly, no country or region has come close to the amount of public investment needed. Planning certainty, for example with regard to technical standards or recyclate specifications, will therefore have a central influence on the total economic costs and pace at which the Circular Economy can be achieved. Here we can certainly learn from the discussion on climate neutrality that a nonlinear path of uncohesive measures and the absence of vision and plans for systemic change always leads to massive additional costs.

From the consumer's point of view, the question increasingly arises as to how the Circular Economy can be meaningfully supported through concrete consumption patterns and consumption decisions, and what concrete advantages and disadvantages are associated with various options. The example of plastic packaging has been in the spotlight since the EU banned single-use plastic in July 2021. It is a prime example of the questions that individual consumers are confronted with, such as:

- Does it really make sense to avoid packaging if it increases the amount of food waste?
- Is plastic packaging really always worse than paper packaging?
- What are "bioplastics" and when do they make sense?
- What do logos with statements such as "circular", "80 % recyclable" and "50 % recycled" mean? Which logos can be trusted and who is behind them?

These questions often require a great deal of research, even for experts, but can hardly be answered satisfactorily by the interested layperson with a reasonable amount of effort. Therefore, the question of a clear vision, for instance with regard to circular packaging systems, which consumers can use as a basis for their consumption patterns, also arises here. If we look at the goals for the Circular Economy currently defined at the level of the EU Member States, we see that there is still a strong focus on waste management and in particular the recycling of individual waste streams (EEA 2019). Only a few countries have set targets for input such as the mass of materials that are subsequently to be recy-

Figure 11
Overview of report targets (number of mentions)



Source: EFA 2019

cled. For instance, the Netherlands has set a target to reduce the consumption of primary raw materials by 50 % by 2030.

The questions of investment planning by companies, the orientation of consumption decisions, and political objectives are closely linked to the topic of the Circular Economy and form the core of "target knowledge".

3.2 EXPERIMENTS AND LIVING LABORATORIES

In the second step, the transformation approach focuses on testing alternatives to the established linear economy in the form of experiments. Creative, innovative solutions for circular business models – from closing material cycles to service concepts of sharing or leasing – should first be tested in niches. Niches are spaces protected from market signals, which serve the development and use of promising technologies by means of experimental spaces for circular solutions. This approach of strategic niche management (SNM) relies on the fact that through experiments with new technologies and new socio-technical arrangements, processes of co-evolution can be stimulated. Co-evolution refers to the simultaneous and mutually influencing change of technologies and the framework conditions of their use (user preferences, networks, regulation, complementary technologies, expectations). As a result, new, more sustainable patterns might emerge, partly embodied in hardware (new technologies) and in new practices based on new experiences and ideas. Such experiments can be envisaged as a niche in which technologies are specified and consumers are defined and concretised. Experiments play an important role in establishing an open-ended search and ongoing learning process (Hoogma 2002).

Cities are in reality one of the main actors in the implementation of waste prevention and zero waste targets, as many federal and European Union (EU) goals are implemented in practice at the municipal level in cities. Cities are particularly noteworthy for the multitude of roles they play in relation to climate and waste policy development. They can be seen as waste producers, waste disposers, advisors, and role models all at the same time. In particular, the communicative instruments of the municipalities can be emphasised as a valuable control and coordination mechanism for successful waste prevention. As the closest level of government to the citizens, the municipality can create a link to private households and companies.

Proximity to the local population and economy is crucial in order to build cooperation with citizens, businesses, and civil society organisations and institutions. In order to achieve savings targets and to make a real contribution to waste prevention, public and private actors must work together. In addition, pioneering cities can also set an example for other cities and lead the change to a low-waste society.

For example, in 2015 the City of Kiel came up with a zero waste guide for public procurement, a ban on single-use plastic in all public organisations, and financial support for families who switch to cloth diapers (Landeshauptstadt Kiel, 2020). The concept has been unanimously accepted by the local parliament and motivated hundreds of stakeholders to engage in the implementation process.

At the regional and national level, the necessary cross-value chain measures as a prerequisite for circular business models often fail due to requirements that are conceived on a sectoral basis. For instance, in order to ensure the proper transfer of waste, the transfer of waste from one place to another is strictly regulated, must be elaborately documented, and may only be carried out by companies licensed to do so. While these regulations very effectively prevent the wild dumping of waste, they are also a major obstacle to so-called "industrial symbioses"; where one company can use another's waste as an input for its production process. Here, prohibitively high costs often arise when the waste would only have to be brought from one side of the road to the other, but a third company has to be involved. The Dutch "Green Deals" have proven very successful to create the necessary room for manoeuvre, especially for the responsible environmental administrations, to create and support such strategic niches for the Circular Economy.

3.3 DIFFUSION AND TAKEAWAYS

For long-term sustainable success, such a phase of experimentation in protected niches must be followed by roll-out into widespread application or integration into the regular structure of dealing with natural resources and waste. As soon as circular business models become competitive with the linear economy through iterative processes of testing and optimisation, they must be scaled sufficiently to develop genuine market relevance.

A current example is the use of recycled plastic in the packaging sector: the European Commission defined minimum recycling rates of 25 % for disposable plastic bottles, so that an enormous demand for correspondingly high-quality recycled plastic has arisen (European Commission, 2019). In view of the sales opportunities secured, recyclers were able to invest in additional capacities for the processing and recycling of PET in particular, but also in new technologies and concepts for collection, the traceability of material flows, and the recyclability of products.

The artificially created niche has consequently caused an enormous innovation push for plastic recycling. Currently, in 2022, the price for high-quality recycled PET is in reality significantly higher than for virgin material – even according to industry estimates, the previously significantly higher costs for PET are hardly relevant today; the central obstacles are rather the availability and the definition of quality standards (GVM, 2019). For the PET subsector, the processes from the niche to the mass market have been successfully achieved and could be extended in a similar form to other types of plastic. At the same time, it would be worth considering making such minimum recyclate quotas dynamic, i. e. in-

creasing them regularly based on technical feasibility and oriented to the recyclate quotas of the market leader. On the other hand, they could also be limited in time, if the use of recyclate also pays off independently on the market after such a phase of state-guaranteed demand.

A second central starting point, which also results from the good practice examples presented, is the necessary conclusions for the institutional design of competencies and responsibilities. The Circular Economy is a cross-cutting challenge in many respects:

– On the one hand, it cannot be achieved by any stakeholder in the value chain alone; it always requires the cooperation and coordinated action of stakeholders who have so far operated according to very different logics and rationalities. Product designers should consider recycling; purchasers and waste management companies must jointly consider where and when recycled material is really needed, etc.

– At the same time, the governance of the Circular Economy therefore goes far beyond classic waste legislation, but must be centrally anchored, for example, in industrial and raw materials policy or also in tax policy. For the competitiveness of circular business models, questions of tax deductibility or consideration in the company balance sheet are now often much more relevant than technical or specific waste-related questions.

As described, the Circular Economy Action Plan lays the foundation for such a comprehensive understanding of circular value creation, which, however, is only gradually and with varying intensity finding its way into national legislation – in many areas, a strong focus on waste disposal and the associated challenges can still be observed (Bahn-Walkowiak et al., 2018). The transformation to the Circular Economy is hence still too often understood as an instrument of hazard prevention – i.e. the principle that waste should be disposed of safely – and less as a design and modernisation task.

One of the key challenges will be to link the Circular Economy with digitalisation in terms of content and institutions. Precisely because thinking in circular structures is characterised by greater complexity than the comparatively simple "take-make-dispose" thinking, digitalisation could represent a central lever for an accelerated transformation. The use of sensor technology could provide data on when and where which wastes arise and lead towards an automated matching of supply and demand: instead of "on spec" as in the past, recyclers would in future produce secondary raw materials precisely in line with the quality requirements of individual companies. The digital product passports massively promoted by the European Commission could mean a breakthrough if the quality of information on individual used products or secondary raw materials were to correspond to that of new products or raw materials. The integration of aspects of the Circular Economy in projects such as Gaia X – the future EU data infrastructure – should therefore be a key priority; so far, the potentials of a digital Circular Economy are not even close to being exploited as technically possible.

With all the hopes for the Circular Economy, however, there should also be a more intensive and transparent discussion about the way in which such disruptive innovations will always produce not only winners but also losers, at least at the individual level. Even if the Circular Economy will bring the hundreds of thousands of new jobs and the increased economic growth that the European Commission hopes for, it will lead to a decline in demand and therefore also job losses and the devaluation of specific skills and professional experience, at least in the classic linear industries such as mining (European Union, 2018). At the level of learning from experiments and pilot projects described here, it will therefore be of central importance to find new innovative solutions to allow even those actors – who may initially have no interest in the circular transformation – to participate in the associated benefits. In the sense of a "just transition", this would require a much more intensive debate on in-service learning for the Circular Economy; so far there has been far too great a focus on top-level university research. Up till now, cooperative concepts of circular business models, which could offer alternatives to the often threatening oligopoly structures of highly integrated value chains, have also hardly been discussed. Only on the basis of such inclusive structural change concepts will it be possible to really make all relevant stakeholders supporters of the Circular Economy, which will be indispensable in view of the ecological as well as the socio-economic necessity of this transformation.

REFERENCES

Bahn-Walkowiak, B., Wilts, H., Koop, C., Meinel, U. & Soloha, R. (2018): CICERONE: Report on current state of the art & understanding of the Circular Economy. URL: https://cicerone-h2020.eu/wp-content/uploads/2020/05/CICERONE-D1.2-Report-on-current-state-of-the-art-understanding-of-the-Circular-Economy.pdf, last access 24.05.2022.

Bau Karussel (2020): Mission Statement. URL: https://www.baukarussell.at/ueber-baukarussell/mission-statement/, last access 24.05.2022.

Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz (BMUV) (2020): Die Obhutspflicht im KrWG. URL: https://www.bmuv.de/themen/wasser-ressourcen-abfall/kreislaufwirtschaft/abfallpolitik/uebersicht-kreislaufwirtschaftsgesetz/die-obhutspflicht-im-kreislaufwirtschaftsgesetz, last access 24.05.2022.

Circular Economy Initiative Deutschland (CEID) (2021): Circular Economy Roadmap für Deutschland. acatech/SYSTEMIQ, München/London 2021. DOI: https://doi.org/10.48669/ceid_2021-3

Circular Flanders (2022): Reuse in Flanders. URL: https://cemonitor.be/en/reuse-in-flanders/, last access 25.05.2022.

Deutscher Bundestag (2015): Aktueller Begriff: Sharing Economy. URL: https://www.bundestag.de/resource/blob/377486/21fc4300787540e3881dbc65797b2cde/sharing-economy-data.pdf, last access 25.05.2022.

Ellen MacArthur Foundation (2021): Completing the picture: how the circular economy tackles climate change.

Environmental Protection Agency Serbia (2017): Report on economic instruments for environmental protection. URL: http://www.sepa.gov.rs/download/posebni/EkonomskiInstrumenti_2017.pdf, last access 23.05.2022.

European Bank (2017): Green Innovation Vouchers scheme in Serbia. URL: https://fintecc.ebrd.com/sites/Satellite?c=Page&cid=1395272658692&pagename=FINTECC%2FPage%2FFINTECC_GenericPage, last access 25.05.2022.

European Commission (2019): Single-use plastics. URL: https://ec.europa.eu/environment/topics/plastics/single-use-plastics_en#objectives, last access 24.05.2022.

European Commission (2020): A new Circular Economy Action Plan. COM (2020) 98. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN, last access 23.05.2022.

European Commission (n.d.): The Just Transition Mechanism: making sure no one is left behind. URL: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en, last access 24.05.2022.

European Environment Agency (EEA) (2019): Resource efficiency and the Circular Economy in Europe 2019 – even more from less. URL: https://www.eea.europa.eu/publications/even-more-from-less, last access 24.05.2022.

European Union (2018): Impacts of Circular Economy policies on the labour market: Final report. DOI:10.2779/574719

Eurostat (2021a): Patents related to recycling and secondary raw materials. URL: https://ec.europa.eu/eurostat/databrowser/view/CEI_CIE020__custom_355163/bookmark/table?lang=de&bookmarkId=2f9c5749-a486-4dbe-8cd9-974884540f79, last access 25.03.2022.

Eurostat (2021b): Circular material use rate. URL: https://ec.europa.eu/eurostat/databrowser/view/cei_srm030/default/table, last access 23.05.2022.

Eurostat (2022a): Generation of municipal waste per capita. URL: https://ec.europa.eu/eurostat/databrowser/view/CEI_PC031__custom_354618/bookmark/table?bookmarkId=ba30dc3d-dfe5-4de2-a445-4cbadb442497, last access 23.05.2022.

Eurostat (2022b):EU self-sufficiency for raw materials. URL: https://ec.europa.eu/eurostat/databrowser/view/cei_pc010/default/table, last access 23.05.2022.

Federal Ministry for Economic Affairs and Climate Action (n.d.): What is Gaia-X? URL: https://www.data-infrastructure.eu/GAIAX/Navigation/EN/Home/home.html, last access 24.05.2022.

Gehrke, T. (2022): Putin's critical raw materials are a threat to EU economic security. In: Egmont from 15.03.2022. URL: https://www.egmontinstitute.be/putins-critical-raw-materials-are-a-threat-to-eu-economic-security/, last access 24.07.2022

Gesellschaft für Verpackungsmarktforschung (2019): Hemmnisse für den Rezyklateinsatz in Kunststoffverpackungen. URL: https://www.hde-klimaschutzoffensive.de/sites/default/files/uploads/document/2019-04/1904_KF_Hemmnisse%20Rezyklateinsatz_HDE-KSO.pdf, last access 24.05.2022.

Green Deals (n.d.): The Green Deals. URL: https://www.greendeals.nl/english, last access 23.05.2022.

Hoogma, R., Weber, M., Lane, B., Schot, J. (2002): Managing the Transition to Sustainable Transport Through Strategic Niche Management, URL: https://www.researchgate.net/publication/257926337_Experimenting_for_Sustainable_Transport_The_Approach_of_Strategic_Niche_Management, DOI:10.4324/9780203994061, last access 24.05.2022

International Resource Panel (IRP) (2019). Global Resources Outlook 2019: Natural Resources for the Future We Want. ISBN: 978-92-807-3741-7.

Kirchherr, J., Reike, D., & Hekkert, M. (2017): "Conceptualizing the Circular Economy: An analysis of 114 definitions" Resources, Conservation and Recycling, Vol. 127, pp. 221–232, https://doi.org/10.1016/j.resconrec.2017.09.005.

Komatsu, T. (2016): De Kringwinkel Antwerpen. Creating Social Value and Environmental Impact through Employment and Reuse. SIMPACT Social Innovation Business Case Study, 2016 (9). URL: http://simpact-project.eu/evidence/sicases/pdf/BCS9.pdf, last access 23.05.2022.

Landeshauptstadt Kiel (2020): Zero Waste-Konzept: Gemeinsam Abfälle vermeiden und Ressourcen schonen. URL: https://www.kiel.de/de/umwelt_verkehr/zerowaste/_dokumente_zerowaste/zerowaste_kiel_konzept.pdf, last access 24.05.2022.

Lundvall, B.-A; Johnson, B.; Andersen, E.; Dalum, B. (2002): National systems of production, innovation and competence building. In: Research Policy, Volume 31, Issue 2, 2002, pp. 213–231. URL: https://doi.org/10.1016/S0048-7333(01)00137-8.

Lundvall, B.-Å. (2007): National Innovation Systems, Analytical Concept and Development Tool. DOI:10.1080/13662710601130863. URL: https://www.researchgate.net/publication/24081600_National_Innovation_Systems-Analytical_Concept_and_Development_Tool, last access 24.05.2022.

Miljøministeriet (n.d.): Borgerindgang. URL: http://mitmiljo.dk, last access 25.05.2022.

Miljøstyrelsen (n.d.): The Danish Eco-Innovation Program. URL: https://ecoinnovation.dk./english/, last access 25.05.2022.

Potting, J., Hekkert, M. P., Worrell, E., & Hanemaaijer, A. (2017): Circular economy: measuring innovation in the product chain (No. 2544). PBL publishers.

Public Service of Wallonia (2017): Responsible public procurement. URL: https://developpementdurable.wallonie.be/achats-publics-responsables, last access 25.05.2022.

RepaNet (2018): BauKarussell. URL: https://www.repanet.at/projekte-2/baukarussell/, last access 24.05.2022.

Spareka (2021): Smartphone Fairphone FP3+. URL: https://www.indicereparabilite.fr/produit/smartphone-fairphone-fp3/, last access 23.05.2022.

Spareka (n.d.): Indice de réparabilité. URL: https://www.indicereparabilite.fr/, last access 23.05.2022.

Statens Offentliga Utredningar (2017): FRÅN VÄRDEKEDJA TILL VÄRDECYKEL – så får Sverige en mer cirkulär ekonomi. URL: https://www.regeringen.se/49550d/contentassets/e9365a9801944aa2adce6ed3a85f0f38/fran-vardekejda-till-vardecykel-2017_22.pdf, last access 25.05.2022.

Statista (2020): Retouren im Online-Handel. URL: https://de.statista.com/statistik/studie/id/14401/dokument/online-retouren--statista-dossier/, last access 25.05.2022.

The World Bank (2022): Unemployment, total (% of total labor force) (national estimate) – Belgium. ULR: https://data.worldbank.org/indicator/SL.UEM.TOTL.NE.ZS?end=2021&locations=BE&start=2006, last access 22.07.2022

van Langen, S. K. & Passaro, R. (2021): The Dutch Green Deals Policy and Its Applicability to Circular Economy Policies. Sustainability. 13. 11683. DOI: 10.3390/su132111683

Wilts, H. & Berg, H. (2017): Digitale Kreislaufwirtschaft – Die Digitale Transformation als Wegbereiter ressourcenschonender Stoffkreisläufe. In-Brief. Wuppertal Institut. URL: https://epub.wupperinst.org/frontdoor/deliver/index/docId/6977/file/6977_Wilts.pdf, last access 23.05.2022.

LIST OF FIGURES AND TABLES

FIGURES

TABLES

IMPRINT

Friedrich-Ebert-Stiftung
Publisher: Competence Centre for Climate and Social Justice | FES Just Climate
Cours St Michel 30e | 1040 Brussels | Belgium
https://justclimate.fes.de/

Responsible for this publication in the FES:
Claudia Detsch, Director of FES Just Climate
Claudia.Detsch@fes.de

Orders/Contact: Clara.Dassonville@fes.de

ISBN 978-3-98628-277-6

Design/Typesetting: pertext, Berlin

FRIEDRICH EBERT STIFTUNG